

Claims

1. A radio transmitter-receiver wherein a pilot symbol that has undergone M-chip spreading on a frequency axis and N-chip spreading on a time axis by means of a spreading code having an $M \times N$ chip length (where M and N are any integers greater than or equal to 2) is used in the transmitter, and in the receiver, a spreading code that is not used in spreading a pilot signal is used as a despreading code to despread a received signal and then estimate noise and interference power; wherein said spreading code that is used in spreading a pilot symbol and said despreading code that is used in despreading are assigned so as to be orthogonal at least in only N chips on the time axis and/or in only M chips on the frequency axis.

2. A radio transmitter-receiver according to claim 1, wherein at least one of code that is orthogonal to said despreading code that is used in despreading even if only in M chips on the frequency axis and/or code that is orthogonal to said despreading code that is used in despreading even if only in N chips on the time axis is preferentially assigned as said spreading code that is used in spreading pilot symbols.

3. A radio transmitter-receiver according to claim 1, further comprising:
means for detecting whether either of channel fluctuation on the frequency axis or channel fluctuation on the time axis is prominent;
wherein:

code that is orthogonal even if only in M chips on the frequency axis is assigned as said spreading code that is used in spreading a pilot symbol when channel fluctuation is prominent on the time axis; and
code that is orthogonal even if only in N chips on the time axis is assigned as
10 said spreading code that is used in spreading a pilot symbol when channel fluctuation is prominent on the frequency axis.

4. A radio transmitter-receiver according to claim 3, wherein delay spread is used as an index of channel fluctuation on the frequency axis.

5. A radio transmitter-receiver according to claim 3, wherein a coherent band is used as an index of channel fluctuation on the frequency axis.

6. A radio transmitter-receiver according to claim 3, wherein Doppler frequency is used as an index of channel fluctuation on the time axis.

7. A radio transmitting and receiving method wherein a pilot symbol that has undergone M-chip spreading on a frequency axis and N-chip spreading on a time axis by means of a spreading code having an $M \times N$ chip length (where M and N are any integers greater than or equal to 2) is used in
5 the transmitter, and in the receiver, a spreading code that is not used in spreading a pilot signal is used as a despreading code to despread a received signal and then estimate noise and interference power;

wherein said spreading code that is used in spreading a pilot symbol and
said despreading code that is used in despreading are assigned so as to be
10 orthogonal at least in only N chips on the time axis and/or in only M chips on
the frequency axis.